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(56) Documents Cited

GB 1543445 A GB 1447778 A GB 0418637 A
DE 003200753 A

(58) Field of Search

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UBA , H2J JLX JSAX JSVP JSVV
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ONLINE DATABASES: WPI

(54) Electric motor control

(57) A series (or compound) motor A101 and control circuit for adjusting effective exciting turn ratio of series field winding according to rotational speed or load current has a switch device SW101 connected between a power supply and multi-tap series field winding S101 for switch action by virtue of accepting eccentric force or according to the signal of change in rotational speed or load current amount in order to change effective exciting turn ratio of series winding and further change the operating characteristics of series motor under respective states.

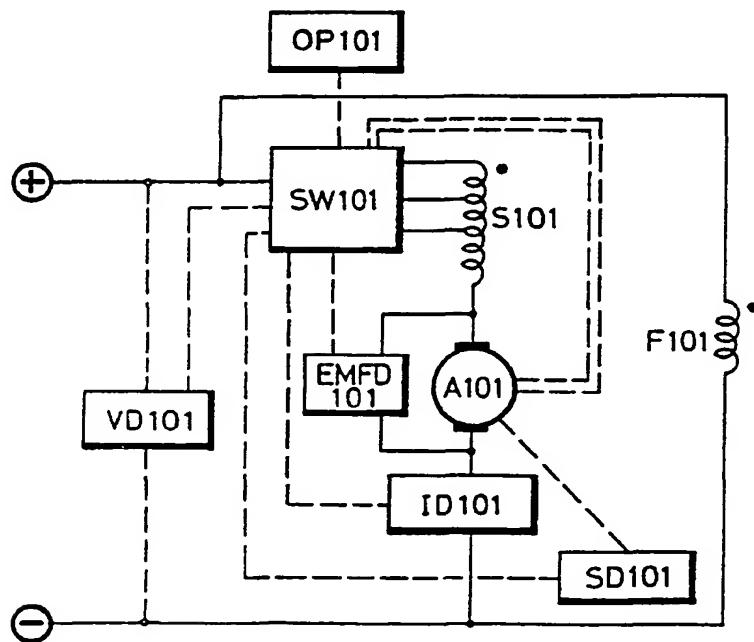


FIG. 1

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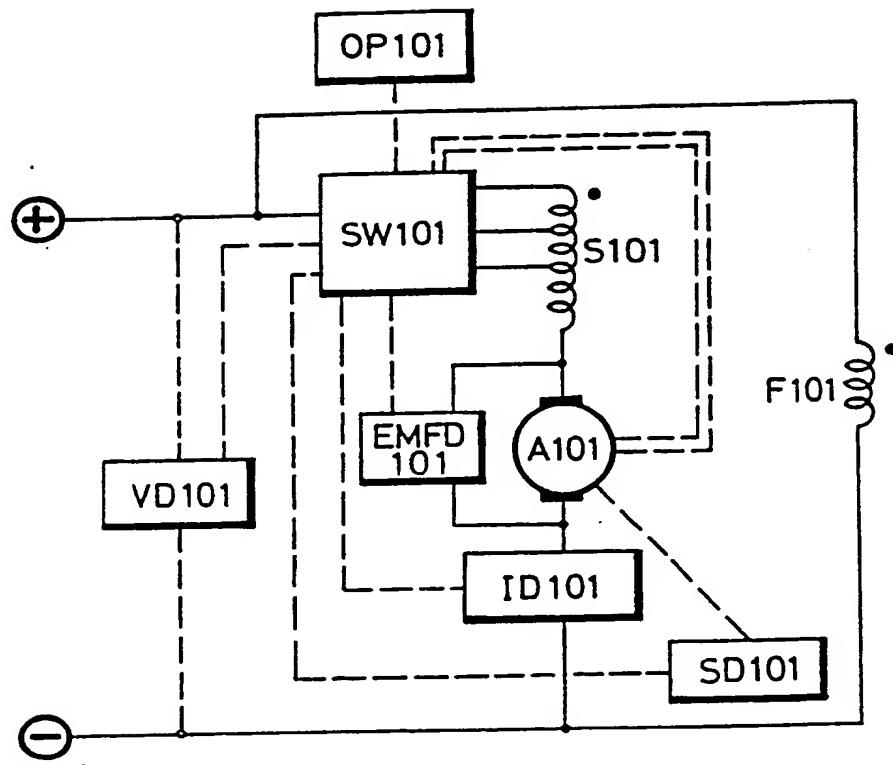


FIG. 1

Series (Or Compound) Motor And Control Circuit For
Adjusting Effective Exciting Turn Ratio Of Series Field
Winding According To Rotational Speed Or Load Current.

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SUMMARY OF THE INVENTION

The present invention relates to a series (or compound) motor and control circuit for adjusting effective exciting turn ratio of series field winding according to rotational speed or load current, and particularly to a switch device mounted between the power supply and multi-tap series field winding for switch action by virtue of accepting eccentric force or according to the signal of change in rotational speed or load current amount in order to change effective exciting turn ratio of series winding and further change the operating characteristics of series motor under respective states.

BRIEF DESCRIPTION OF THE INVENTION

20 FIG. 1 is a diagram showing the closed-loop type primary circuit of series (or compound) motor and circuit for adjusting effective exciting turn ratio of series field winding according to rotational speed or load current.

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DETAILED DESCRIPTION OF THE INVENTION

The conventional series (or compound) motor, the turn ratio of its series field winding is adjusted subject to the difference of optimal rotational speed - high speed type series field winding should have lower turn ratio and low speed type should have higher turn ratio. Therefor , a

critical value is often taken when the demand of speed ranges relatively wide; the present design is to overcome the said limit and disclose a series (or compound) motor and control circuit for adjusting effective exciting turn ratio of series field winding according to rotational speed or load current, and particularly to the greater load current the effective series winding is adjusted by the switch to satisfy the series (or compound) motor having lower saturated exciting turn ratio. More specifically, it relates 10 to a switch device mounted between the power supply and multi-tap series field winding for switch action by virtue of accepting eccentric force or according to the signal of change in rotational speed or load current amount in order to change effective exciting turn ratio of series winding 15 and further change the operating characteristics of series motor under respective states.

FIG. 1 is a diagram showing the closed-loop type primary circuit of series (or compound) motor and circuit for adjusting effective exciting turn ratio of series field 20 winding according to rotational speed or load current, which comprises:

at least one DC series motor consisted of multi-tap series field winding S101 and armature A101 or further a compound motor having shunt winding F101;

25 at least one selective and alternative switch device SW101 consisted of analogical or digital signal processing circuit and electro-mechanical or solid-state switch element, including a common pin leading to the power supply and each tap leading to the series field winding S101 for 30 the control with eccentric force; or control by analogical

or digital signal detector SD101 according to the change in motor rotational speed or control by analogical or digital type detector ID101 according to motor load current or control by armature EMF detector EMFD101 in order to enable
5 the selective and alternative switch device SW101 to alternate the motor; when the load is lower and current smaller, effective exciting turn ratio of series field winding S101 becomes higher; on the contrary when the load is higher and current rising up, the selective and
10 alternative switch device SW101 will switch to the low effective exciting turn ratio;

the circuit may further include power supply voltage detector VD101 for measuring voltage value of power supply in order to correct the control command of selective and
15 alternative switch device and such correction value may include the higher voltage is the selective and alternative switch device inclines to increase turn ratio of effective exciting series field winding, and such inclination combines the said motor load current or rotational speed value to
20 form a parameter for the selective and alternative switch device;

operating input device OP101 consisted of manual or out-connected signal interface for input relevant data to selective and alternative switch device.

25 The above-said circuit is consisted of closed-loop type primary circuit to employ motor load current or EMF as reference signal for control, and chiefly to disclose DC series (or compound) motor driven by single voltage or variable voltage power supply; and further including load
30 current detector or motor rotational speed detector or

armature EMF detector, or eccentric driving device in company with the known motor dynamic characteristics and with reference to the command of operating input device for relative operation selection by the selective and 5 alternative switch device.

For practical application, the present series (or compound) motor and circuit for adjusting effective exciting turn ratio of series field winding according to rotational speed or load current may include some operating interface 10 subject to the actual requirement, and its function including:

- (1) Manual selective/alternative switch device to change effective exciting winding turn ratio of series field.
- (2) Eccentric force selective/alternative switch device to change effective exciting winding turn ratio of series 15 field.
- (3) Motor rotational speed detector SD101 for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.
- 20 (4) Load current detector ID101 for operating the selective/ alternative switch device to change effective exciting winding turn ratio of series field.
- (5) Armature EMF detector EMF101 for operating the selective /alternative switch device to change effective exciting 25 winding turn ratio of series field.
- (6) Power supply voltage detector for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.
- (7) A combination of Item (1) and (2) for operating the 30 selective/alternative switch device to change eff ctive

exciting winding turn ratio of series field.

(8) A combination of Item (1) and (4) for op rating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

5 (9) A combination of Item (1) and (5) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

(10) A combination of Item (1), (3), (6) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

10 (11) A combination of Item (1), (4), (6) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

(12) A combination of Item (1), (5), (6) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

15 (13) A combination of Item (1), (5), (6) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

(14) A combination of Item (4) and (6) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

20 (15) A combination of Item (5) and (6) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

25 (16) A combination of Item (1), (3), (4) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

(17) A combination of Item (1), (3), (5) for op rating the selective/alternative switch device to change effective

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exciting winding turn ratio of series field.

(18)A combination of Item (1), (4), (5) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

5 (19)A combination of Item (3) and (4) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

(20)A combination of Item (3) and (5) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

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(21)A combination of Item (4) and (5) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

15 The above-said various items of applications can be selected subject to such factors as horsepower and load in order to enrich the purpose of applications.

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1. A series (or compound) motor and control circuit for
adjusting effective exciting turn ratio of series field
5 winding according to rotational speed or load current, and
particularly to a switch device mounted between the power
supply and multi-tap series field winding for switch action
by virtue of accepting eccentric force or according to the
signal of change in rotational speed or load current amount
10 in order to change effective exciting turn ratio of series
winding and further change the operating characteristics of
series motor under respective states, and its closed-loop
type primary circuit comprising:

at least one DC series motor consisted of multi-tap
15 series field winding S101 and armature A101 or further a
compound motor having shunt winding F101;

at least one selective and alternative switch device
SW101 consisted of analogical or digital signal processing
circuit and electro-mechanical or solid-state switch
20 element, including a common pin leading to the power supply
and each tap leading to the series field winding S101 for
the control with eccentric force; or control by analogical
or digital signal detector SD101 according to the change in
motor rotational speed or control by analogical or digital
25 type detector ID101 according to motor load current or
control by armature EMF detector EMFD101 in order to enable
the selective and alternative switch device SW101 to
alternate the motor; when the load is lower and current
smaller, effective exciting turn ratio of series field
30 winding S101 becomes higher; on the contrary when the load

is higher and current rising up, the selective and alternative switch device SW101 will switch to the low effective exciting turn ratio;

the circuit may further include power supply voltage 5 detector VD101 for measuring voltage value of power supply in order to correct the control command of selective and alternative switch device and such correction value may include the higher voltage is the selective and alternative switch device inclines to increase turn ratio of effective 10 exciting series field winding, and such inclination combines the said motor load current or rotational speed value to form a parameter for the selective and alternative switch device;

operating input device OP101 consisted of manual or 15 out-connected signal interface for input relevant data to selective and alternative switch device.

2. The series (or compound) motor and circuit for adjusting effective exciting turn ratio of series field 20 winding according to rotational speed or load current as claimed in claim 1, may include some operating interface subject to the actual requirement, and its function including:

- (1) Manual selective/alternative switch device to change 25 effective exciting winding turn ratio of series field.
- (2) Eccentric force selective/alternative switch device to change effective exciting winding turn ratio of series field.
- (3) Motor rotational speed detector SD101 for operating the 30 selective/alternative switch device to change effective

exciting winding turn ratio of series field.

(4) Load current detector ID101 for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

5 (5) Armature EMF detector EMF101 for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

(6) Power supply voltage detector for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

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(7) A combination of Item (1) and (2) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

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(8) A combination of Item (1) and (4) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

(9) A combination of Item (1) and (5) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

20 (10) A combination of Item (1), (3), (6) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

(11) A combination of Item (1), (4), (6) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

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(12) A combination of Item (1), (5), (6) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

(13) A combination of Item (1), (5), (6) for operating the

30 selective/alternative switch device to change effective

exciting winding turn ratio of series field.

(14) A combination of Item (4) and (6) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

5 (15) A combination of Item (5) and (6) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

(16) A combination of Item (1), (3), (4) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

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(17) A combination of Item (1), (3), (5) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

(18) A combination of Item (1), (4), (5) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

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(19) A combination of Item (3) and (4) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

20 (20) A combination of Item (3) and (5) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

(21) A combination of Item (4) and (5) for operating the selective/alternative switch device to change effective exciting winding turn ratio of series field.

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Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

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Relevant Technical fields

(i) UK CI (Edition K) H2J (JSAX, JSVV, JSVP, JLX)
GR3 (RBN32, RBN34, RBN35)
G3U (UBA)
5 HO2P 7/28, 7/282

(ii) Int CI (Edition)

Search Examiner

B J EDE

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI

Date of Search

20 OCTOBER 1992

Documents considered relevant following a search in respect of claims 1 AND 2

Category (see over)	Identity of document and relevant passages		Relevant to claim(s)
A	GB 1543445	(SHINKO ELECTRIC) see S1-S3, F1-F3 Figure 3	1
A	GB 1447778	(ISE) see Th F1, F2	1
A	GB 418637	(W DORNING) see 51-54, M1-M4	1
A	DE 3200753 A	(AKO-WERKE GMBH) see 2, 45 and 7	1

Category	Identity of document and relevant passages	Relevant to claim(s)

Cat gories of documents

X: Document indicating lack of novelty or of inventive step.

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E: Patent document published on r after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document

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